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ABSTRACT

It was hypothesized that children, like adults, cognize social groups by applying social schemata. Their facility with social schemata was predicted to be a function of their level of cognitive development. When children were asked to complete partial social structures, formal and concrete operational, but not preoperational children, readily generated perfect structures. Particularly with concrete operations children, it was observed that the predisposition toward closure was stronger for vertical than horizontal structures. These results were interpreted with reference to the theory and observations of Piaget (1950). Implications for the understanding of the actual social groups of children were discussed. (Author)

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Cognitive Development and the Cognition of Horizontal & Vertical Social Structures

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Abstract

It was hypothesized that children, like adults, cognize social groups by applying social schemata. Their facility with social schemata was predicted to be a function of their level of cognitive development. When children were asked to complete partial social structures, formal and concrete operational, but not preoperational children, readily generated perfect structures, $p < .05$. Particularly with concrete operations children, it was observed that the predisposition toward closure was stronger for vertical than horizontal structures, $p < .05$. These results were interpreted with reference to the theory and observations of Piaget (1950). Implications for the understanding of the actual social groups of children were discussed.

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Cognitive Development and the Cognition of Horizontal & Vertical Social Structures

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Many reasons have been offered to explain why young children participate in social groups. Shaw (1976) suggests that like adults, children form groups through the infuuence of such factors as perceived similarity, interpersonal attraction, and the rewards of cooperation. However, these explanations do not seem to fully account for the emergence of complex group activity in kindergarten and elementary school aged children. Before this period most children participate in simple dyadic social groups (Parten, 1932; Merei, 1949.) Changes in the social environment of older children might occasion the learning of social behavior appropriate for larger social structures. However, during this same period children show tremendous advancements in their cognitive abilities (Piaget, 1950). These changes in cognitive skills may also affect social behavior. The emergence of group structures may be supported by the development of particular cognitive mechanisms.

Evidence from the literature on the learning of social structures by adults suggests that adults possess social cognitive biases or schemata (DeSoto, 1960; Kuethe, 1962; Walker 1976). Balancing, grouping and ordering schemata have been identified (DeSoto & Albrecht, 1968).

As predicted by Heider (1958) people tend to prefer balanced social structures. Adults seem predisposed to learn balance structures in which three individuals like each other, or in which two friends mutually dislike a third party (Zajonc & Burnstein,1965). Atwood (1969) found that children also prefer balanced structures. But what is most interesting about Atwoods' study is his finding that balance

tendencies are correlated with intellectual development as defined by Piaget (1950). Concrete and formal operations children consistently balanced the social structures presented them, where as, intuitive children balanced none of the structures that they received.

Few other studies have been done to test the relationships between cognitive development and social schemata. Recently, Walker (1976) gave evidence that adults employ two simple linear social schema, namely horizontal and vertical, in their learning and perception of social structures. When a horizontal social schema is activated, people expect an egalitarian social group composed of symmetrical and transitive relationships. On the other hand, when a vertical schema is aroused, people anticipate a rank-ordered social group possessing asymmetrical and transitive relationships.

The relationship properties of symmetry or asymmetry distinguish horizontal from vertical social structures. Both kinds of structures possess the property of transitivity: by this we mean, for exmaple, if Pete likes Bob, and Bob likes Jim, then Pete likes Jim (horizontal); if Pete dominates Bob, and Bob dominates Jim, then Pete dominates Jim (vertical). It appears that the property of transitivity gives consistency to a social structure and permits the cognizing of structures larger and more complex than the dyad.

We hypothesized that adults or children who do not possess or use a transitive rule, will not effectively cognize a social structure. Furthermore, we predicted that there is a relationship between cognitive development and the possession or use of horizontal and vertical social schemata. Specifically, we expected that most formal, some concrete, and very few preoperation children will exhibit transitive responses when asked to complete partial horizontal and vertical social structures.

And secondly, consistent with the findings reported by Witken et al. (1962),

and Mussen (1970), we expected that female as compared to male children will give more transitive responses.

Method

Overview

The experiment was divided into two sessions about one week apart. Each session lasted about one-half hour. During the first meeting, children were given a series of four standardized Piagetian tasks to determine their level of cognitive development. During the second session, selected children were asked to complete partial social structures acted out by puppets on a video tape. Children could complete the stories by selecting an ending that indicated that they expected either a transitive or intransitive social structure, or no social structure.

Subject Selection

Thirty boys and thirty girls attending area nursery and elementary schools were divided into three cognitive developmental groups, preoperational, concrete operational and formal operational, according to the standardized tasks. Where possible, conservation tasks were used for classification. For the preoperational group a test of the Law of Floating Bodies was presented. Each child received four tasks, two at his presumed level of competence and two at another level.

In each of the three groups the children were first given two tasks below their level of competence, then they were given two tasks at the next highest level to see whether they were either in a transitional stage or had already reached a higher stage of development. The use of age in the initial subject selection for testing was guided by the previously cited data. Age served as a factor for selection in order to eliminate extreme subjects, both mental defectives and gifted children. If such children were identified they were eliminated further from the study.

Ten males and ten females were classified as preoperational (mean age 5 years, 3 months), concrete operational (mean age 10 years, 8 months), and formal operational (mean age 15 years, 4 months).

Task and Social Stimuli-

Social stories were acted out by puppets involving triads in either horizontal or vertical social structures. These short stories and relationship words were chosen for their ability to arouse social schemata. The names used in the stories were taken from an a priori selection of commonly used and recognized names in American society. The relationship words were pilot tested to insure they possessed asymmetric or symmetric properties.

Across the ten stories each of the names was used only once to eliminate subject's confusion of puppet identity. Five trials for each of the two social structures were presented for a total of ten triadic presentations. Although no order effects were anticipated, the ten stories were randomized.

The same orders were presented to the three cognitive groups. Each of the stories utilized different relationship words. This was done to minimize the extraneous effects of particular words.

As seen on the video tape, puppets acted out short stories indicating a relationship between two of the three characters. Subjects were asked to predict the relationship of the third member of the triad to the first by pointing to the correct response on a triple split screen presentation of the relationships. On the triple screen three different situations were depicted by puppets "frozen" in action indicating the correct transitive relationship, the incorrect, intransitive relationship, or an activity which was irrelevant to the story and structure. Randomization of position of the three scenes was done in order to prevent a position bias in answering.

Results

The principal data collected and analyzed were the total number of transitive responses made by each subject on five vertical and five horizontal stories. A mixed 3 x 2 x 2 analysis was performed to test the effects of Cognitive level and Sex (Between Subjects) and Social Structures (Within Subjects). The results of the analysis are summarized in Table 1, and can be observed in Figure 1.

The difference in the number of transitive responses was in the predicted direction, and was significant as indicated by a main effect of cognitive level, F (2, 54) = 23.34, $p < .001$.

As proposed, a shift from non-use to use of schemata was seen in the concrete operational group. A Scheffé test indicated that among the three groups, significant differences were found between the preoperational and concrete, and the preoperational and the formal operational children, $p < .05$.

Further examination of the data shows that the number of horizontal responses differed among all three groups. Comparisons between the preoperational and concrete, concrete and formal, and, formal and preoperational levels were all greater than what would be predicted by chance, $p < .05$. For vertical structures, significant differences existed only between the preoperational and concrete, and preoperational and formal operational levels. These results are summarized in Table 2.

No sex differences were found in this study. Males and females performed equally well at all three cognitive levels on both vertical and horizontal social structures. Although no significant sex differences were seen in the effect of horizontal and vertical structure, the analysis indicated a main effect of social structure and an interaction between cognitive level and social structure. Overall, more vertical then horizontal transitive responses were made, F (1, 54) = 4.04, $p < .05$. In addition, the number of transitive responses to a particular

type of structure was dependent on the cognitive level, F (2, 54) = 3.49, $p < .05$. Scheffé comparisons of means revealed that at the preoperational level equal numbers of horizontal and vertical transitive responses were made; while at the concrete and formal levels a greater number of transitive completions were given to vertical structure stories than horizontal, $p < .05$. A predisposition to expect vertical structures seems to have emerged most strongly during the concrete period.

Discussion

The results of this experiment support the conclusion that there is an association between intellectual development and social cognition. Formal and concrete operational children reliably generated from partial social structures perfect, complete horizontal and vertical structures. No comparable behavior was observed with the preoperational children.

The formal and concrete operational children in this experiment gave evidence that they utilized social schemata that are very similar to those said to be possessed by adults (DeSoto, 1960; Walker, 1976). Like adults, when presented a few asymmetric relationships they applied a transitive rule to create a new relationship and thus form a vertical structure. Likewise, they attributed symmetry to unknown relationships consistent with definitions of horizontal structures (Walker, 1976) or principles of balance (Heider, 1958; Atwood, 1969).

However, children apparently do not have equal facility with, or predispositions toward both types of social structures. Specifically, it was observed that more transitive responses were made to form vertical than horizontal social structures. A close examination of the data showed that this effect was most evident in the performance of concrete operational children.

According to Piaget (1950), the transitive principle is acquired during the period of concrete operations. At this time the child begins to use the

transitive rule with symmetrical or asymmetrical relations to form groupings or orderings. Why then, do children have a stronger tendency to construct vertical structures than horizontal structures? DeSota & Kuethe (1958) suggest that children (8-10 years) attribute intransitivity to symmetrical relations such as "likes" because of their limited experience with large friendship groups. But these same investigators have given evidence that adults also have a stronger predilection for forming an ordering than for forming a grouping.

No research or theories seem to provide a good explanation of why it is that we have a stronger cognitive predisposition to generate vertical than horizontal social structures. Some of our current research is directed at answering that question. We think it would be interesting to know why it is that we are more inclined to dominate than to like each other.

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Table 1

An Analysis Of Variance Test Of The Effect Of Cognitive Level And Sex On Childrens' Transitive Relationship Responses To Social Structures.

Source	df	MS	F
Cognitive Level (A)	2	58.659	28.338**
SEX (B)	1	.009	.004
AXB	2	.158	.076
Error (bg)	54	2.070	---
Social Structure (C)	1	4.409	4.041*
AXC	2	3.808	3.490*
BXC	1	.673	.617
AXBXC	2	.476	.436
Error (wg)	54	1.091	---

*p. $<$ .05

**p. $<$ .01

Table 2

Scheffé Comparisons of Mean Transitive Responses of Children at Different Levels of Cognitive Development to Horizontal and Vertical Social Structures

Condition Comparison	M_1-M_2	D
Horizontal Social Structures		
Preoperational-Concrete	2.30-3.45	-1.15*
Concrete-Formal	3.45-4.20	- .75*
Preoperational-Formal	2.30-4.20	-1.90*
Vertical Social Structures		
Preoperational-Concrete	2.00-4.35	-2.35*
Concrete-Formal	4.35-4.75	- .40
Preoperational-Formal	2.00-4.75	-2.75*
Horizontal & Vertical Structures		
Preoperational-Concrete	2.15-3.90	-1.75*
Concrete-Formal	3.90-4.48	- .58
Preoperational-Concrete	2.15-4.48	-2.33*

* $p < .05$

Table 3

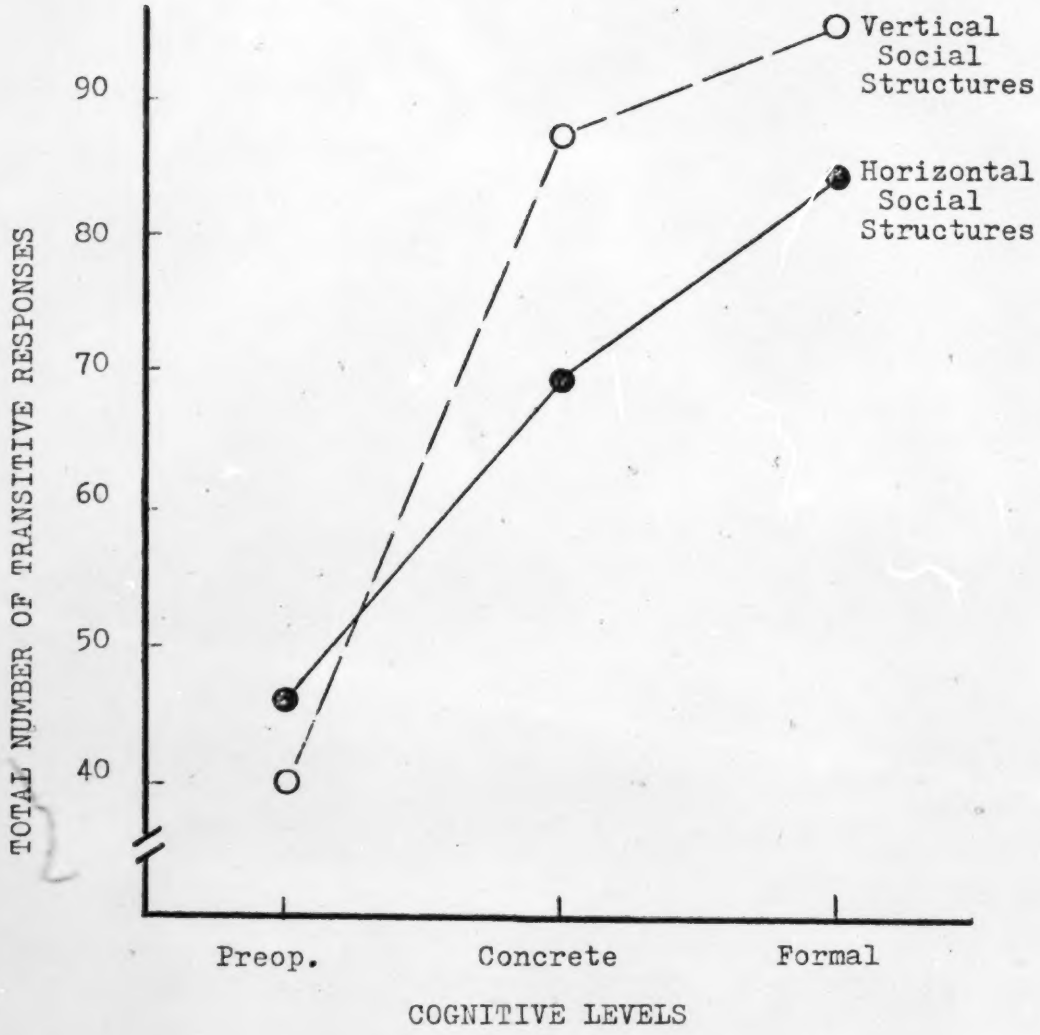
Scheffé Comparisons of Transitive Response to Horizontal Versus Vertical Social Structures by Children at Different Levels of Cognitive Development.

Condition Comparison	M_1-M_2	D
Preoperational		
Horizontal-Vertical	2.30-2.00	.30
Concrete Operational		
Horizontal-Vertical	3.45-4.35	-.90*
Formal Operational		
Horizontal-Vertical	4.20-4.75	-.55

*$p < .05$

Figure Caption

Figure 1. A comparison of the tendencies of children at different cognitive levels to assign transitivity to relationships within horizontal and vertical social structures.


Vertical
Social
Structures
Horizontal
Social
Structures
90
80
70
60
50
40
TOTAL NUMBER OF TRANSITIVE RESPONSES
Preop.
Concrete
Formal
COGNITIVE LEVELS